Exploration and Practice of "Four-Dimension, Tri-Mentors, Dual-Course and One-Guarantee" Talent Training Mode from the Perspective of Entrepreneurship and Innovation

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Abstract: Aiming at the problems such as insufficient integration of specialized innovation and entrepreneurship, weak teachers of innovation and entrepreneurship education and imperfect quality assurance system in the teaching of double innovation and entrepreneurship, we innovatively proposed a four-in-one training system for entrepreneurship and innovation talents, including "four dimensions, tri-mendor, two classrooms and one guarantee". Based on the concept of OBE, a new four-dimensional training model of "student-centered, ablity-cored, results-oriented, profession and innovation integration" is proposed to solve the disconnection between professional training and entrepreneurship training. By leading professional teachers and introducing enterprise mentors, the establishment of " professional teachers, innovation mentors, and enterprise mentors " tri-mendor of entrepreneurship and innovation, to solve the problem of the shortage of entrepreneurship and innovation teachers. The dual-course model of "professional course" and " entrepreneurship and innovation course" is built for college students to solve the problem of insufficient entrepreneurship education in professional training. Then, a quality evaluation system for the training of entrepreneurship and innovation talents is established. The implementation of the proposed mode will help the high-quality development of new engineering education, promote the formation of an innovative culture and a quality education system, and will certainly cultivate application-oriented talents with firm ideals and beliefs, solid multidisciplinary theoretical foundation and engineering practice ability, good professional literacy and normative consciousness, and scientific literacy and innovative practice ability.

Keywords: Four-Dimension; Tri-Mentors; Dual-Course; One-Guarantee; Entrepreneurship and Innovation Education

1. Introduction

Firstly, red cultural resources have distinct ideological and political education values. Red culture is an important component of China's revolutionary history, carrying the deeds and spirit of revolutionary predecessors [1]. By learning and experiencing red culture, college students can deeply understand the great significance of the revolutionary predecessors fighting for national independence and people's happiness, thereby enhancing their love and pride for the motherland, and cultivating correct values and outlook on life [2]. Since the concept of "mass entrepreneurship and innovation" was first put forward, the State Council has successively issued documents such as "Implementation Opinions on Deepening the reform of Innovation and Entrepreneurship Education in Colleges and Universities" and "Opinions on Promoting high-quality development of Innovation and Entrepreneurship and Creating an upgraded version of" Mass Innovation and Entrepreneurship", which put forward clear requirements for deepening the reform of innovation and entrepreneurship education in colleges and universities. Among them, it is emphasized that "all colleges and universities should promote the organic integration of professional education and innovation and entrepreneurship education according to the orientation of talent training and the requirements of innovation and entrepreneurship education goals, adjust the

professional curriculum, explore and enrich the innovation and entrepreneurship education resources of various professional courses, and strengthen innovation and entrepreneurship education in the process of implanting professional knowledge. "[3]

Innovation is the soul of a nation and the inexhaustible driving force for the prosperity of a country. At present, improving the innovative spirit and ability of college students is the requirement of the Times, and it is also the key and difficult point to improve the teaching quality. [4] This is the weakness of China's higher education, but also we face a serious challenge. the fundamental problem of higher education has always been the quality of personnel training, the core of which is the cultivation of students' innovative spirit and innovative entrepreneurial ability -- innovative talents. [5] As the main force of higher education, the university's innovation and entrepreneurship ability is the core element of "market quality and brand" and the focus of social attention. [6] It is also the hot and difficult point for universities to deepen reform and improve the quality of running schools.

As the core link to achieve the goal of talent training, professional education needs to combine the characteristics of disciplines and keep up with the trend of social economy and technology development. [7-9] Integrating innovation and entrepreneurship education into professional education can not only stimulate students' interest in learning professional knowledge, but also stimulate new vitality for the further development of traditional majors. In particular, combining with the concept of outcome-based education (OBE), it will more effectively promote the continuous reform and innovation of higher education disciplines. Especially for new engineering majors, the cultivation of professional talents pays more attention to innovative practice and the ability to solve practical engineering problems, and highlights the industry-oriented teaching mode that combines innovation and integration with industry-university-research and application, which plays a real role in promoting the cultivation of innovative, creative and entrepreneurial talents. [10]

Under the above background, this paper focuses on the common problems existing in the training of mass innovation and innovative talents, explores new ideas and new ideas on the training of mass innovation and innovative talents based on the concept of physical ability, and promotes the deep integration of professional education and innovation and entrepreneurship education. Explore a new mode of training mass innovation talents, propose a “Four-Dimension, Tri- Mentors, Dual-Course and One-Guarantee” training system for innovation talents, and build a double-class mode of "professional course" and " innovation course "; the establishment of "professional teachers, innovative teachers, enterprise mentors" tri-mendor; Based on the concept of OBE, innovative attempts to "student-centered, abilty-cored, results-oriented, profession and innovation integration" four-dimensional entrepreneurial and innovative talent training new ideas; At the same time, establish a quality assurance system for entrepreneurial and innovative talents, establish a standardized management system and quality evaluation system, and form a closed loop for the training of entrepreneurial and innovative talents.

2. Current Situation and Dilemma of Innovation and Entrepreneurship Education

2.1 Shallow Specialized Integration, Training Mode of Innovative Talents in Need of Reform

At present, the education on innovation and entrepreneurship of college students and related supporting measures are gradually carried out in colleges and universities, but the overall implementation effect is still not obvious in application-oriented undergraduate colleges and universities, and most of the time it only stays in part of the mass innovation education courses, or as a supplement to the elective courses, and does not integrate innovative education into the entire talent training program. There is a disconnect between entrepreneurship and innovation education and professional education, and the talent training system of entrepreneurship and innovation education is not systematic and clear, and lacks innovative ideas and concepts. At the National Undergraduate Education Conference, Minister Baosheng Chen proposed that it is necessary to constantly promote ideological innovation, concept innovation, method and technology innovation and model

innovation in higher education. As a new engineering major, more emphasis should be placed on the cultivation of students' innovative and creative ability, practical ability, and ability to solve practical engineering problems. It is necessary to integrate innovation and entrepreneurship education into the whole process of education. It is not only necessary to have "innovative courses", but also to truly achieve "curriculum innovation" and "specialized innovation and integration", solve the problem of the disconnection between innovation and entrepreneurship education and professional education, and reform the training mode of innovative talents. Make the training of innovative and entrepreneurial talents deep into the whole teaching cycle of professional talent training.

2.2 Weak Teacher Sources of Innovation and Entrepreneurship Education

Some colleges and universities have entrepreneurship and entrepreneurship courses undertaken by counselors, most of whom have professional background in operation management, but lack the corresponding practical experience in innovation and entrepreneurship. There is also a completely by the experimental teacher responsible for, and professional teachers, professional construction is completely disconnected, can not play a role in promoting mutual progress. Some universities also employ enterprise experts as off-campus innovation and entrepreneurship mentors, but the experts are not familiar with the educational method of colleges and universities, and the teaching effect is not ideal. In addition, in terms of innovation and entrepreneurship education, most colleges and universities have not issued corresponding management policies and incentive policies, resulting in low enthusiasm for teachers' guidance, fewer professional tutors engaged in innovation and entrepreneurship education, and chaotic management. There are also common problems such as the lack of close combination of professional and mass entrepreneurship work, the lack of professional tutors, and the lack of standardization evaluation.

2.3 The Quality Assurance System in Need of Improve

In view of the unsystematic work of the college, the management of the club is not standardized, and the lack of institutional mechanisms. the innovation and entrepreneurship projects set up by incubation did not successfully conclude due to management problems, and the realization of industrial transformation was rare. It is urgent to establish a quality assurance system, realize institutionalized management, strengthen project process management norms, establish a comprehensive, diversified and multi-angle quality evaluation system, effective two-way feedback mechanism, incentive system, and lay an institutional foundation for the training of double and creative talents.

3. "Four-Dimension, Tri- Mentors, Dual-Course and One-Guarantee" Talent Training Mode

In view of the problems of non-systematic and systematic lack of professionalism in the training of new engineering innovation and entrepreneurship talents, new ideas and ideas for mass innovation and entrepreneurship talent training should be proposed to reform of the training system of innovation and entrepreneurship talents. With the goal of cultivating students' innovation awareness and practical ability, and helping students better adapt to the future job market and social environment, we build a " Four-Dimension, Tri-Mentors, Dual-Course and One-Guarantee " innovation and innovation talent training system. the overall system is illustrated in **Figure 1.**

Firstly, we need to carry out the innovation and entrepreneurship training plan for college students. Based on the concept of OBE, we propose a new mode of "student-centered, ability-cored, results-oriented, and profession and innovation integration" to cultivate innovative and entrepreneurial talents, and put the training system of innovative practical talents into practice and penetrate into all aspects of student training.

Secondly, we reform of entrepreneurship and innovation teacher team to solve the problems of insufficient entrepreneurship and innovation teachers, insufficient participation of professional teachers, and insufficient engineering practice ability of teachers, and put forward new ideas for the construction of entrepreneurship and innovation teacher team. Establish a tri-mendor guidance team of

"professional teachers, innovation mentors, and enterprise mentors", draw professional teachers as the main force to participate in entrepreneurship and innovation guidance through specialized innovation integration mode, and realize tripartite co-education through industrial practice with the help of enterprise mentors, so as to effectively solve the problems of insufficient entrepreneurship and innovation teachers and insufficient engineering practice ability of teachers.

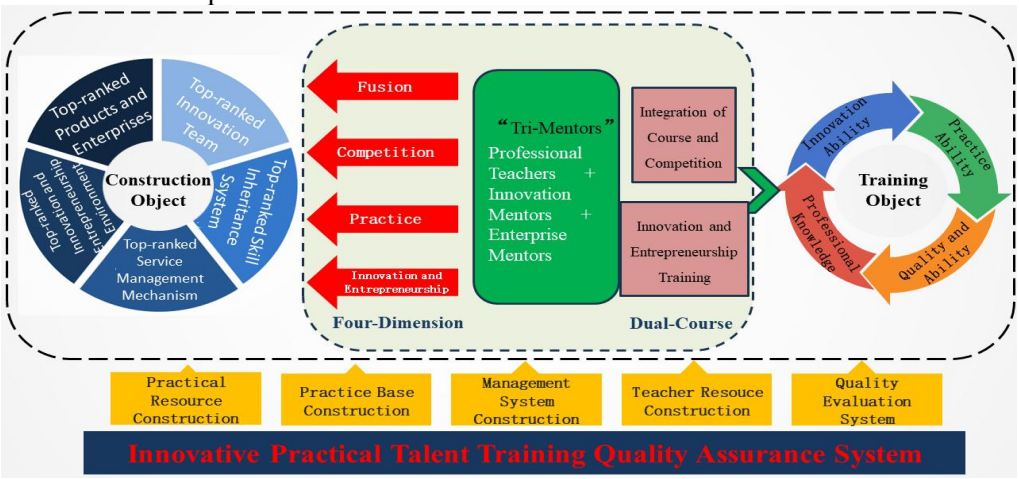

Figure 1. Innovative Practical Talent Training Quality Assurance Svstem

Next, aiming at the disconnection between entrepreneurship and innovation education and the unclear goal of talent training, reform is carried out, we build a dual-course mode of "professional course" and "entrepreneurship and innovation course", and a second class of entrepreneurship and innovation relying on the Innovation Club. In the professional courses, we add the practice process, so that students can learn and practice the technology and hardware system related to science and technology competition.

Aiming at the problems of inadequate management system standardization, lack of incentive system and quality evaluation system, the new concept of building a fully closed-loop quality evaluation system is proposed. To ensure quality assurance for the implementation of mass innovation and innovation talent training mode, the quality assurance system for mass innovation and innovation talents should be established from the aspects of management system standardization, quality evaluation supervision and incentive to ensure the formation of a closed loop for innovation and innovation talent training.

4. Implementation

4.1 Four-Dimensional Entrepreneurship and Innovation Talent Training Mode

Based on the OBE concept, we propose a four-dimensional entrepreneurship and innovation talent training model of "student-centered, ability-cored, results-oriented, and profession and innovation integration". Adhering to the fundamental starting point of being student-centered, adhering to the ability training as the core point, taking the output as the orientation, taking the outcome output as the evaluation index of the quality evaluation of entrepreneurship and innovation talent training, deepening the integration of entrepreneurship and innovation education and professional education, and diversified cultivation and formation paths of results, which not only rely on the organizational system of entrepreneurship and innovation practice, but also come from professional classrooms. Deepening the integration of specialized innovation and innovation is the key channel and main way for the training of mass innovation and innovation talents. the construction of this integrated training model helps to promote the realization of professional graduation requirements, and lays the foundation for professional engineering education certification. In the process of talent training, the training approach, achievement output and practical ability training are highlighted, and the characteristic training idea of cultivating students with "7 comprehensive abilities as the core, 7 innovative achievements as the guidance and 7 comprehensive training as the path" is formed, combined with the

characteristics of new engineering majors. Aiming at cultivating students' comprehensive abilities in data retrieval, scientific and technological paper writing, expression, practical operation, engineering scheme design, innovative thinking, and entrepreneurship and employment, the curriculum system, guidance system and practice system of innovation and entrepreneurship education are built to comprehensively improve college students' comprehensive innovation and entrepreneurship ability. Training is carried out through seven paths, including course content of innovation and entrepreneurship, scientific and technological paper writing, experimental training project, practical training project, innovation project (national innovation, school innovation, teacher sub-project), innovation and entrepreneurship competition activity, graduation thesis (design), guided by scientific innovation project and competition, promoting learning through competition and enhancing ability through practice, and effectively improving students' comprehensive innovation and entrepreneurship ability. We will implement the model of education in practice. the thought of innovation and integration runs through the above whole process, which provides strong support for the construction of applied talent training mode of innovation and entrepreneurship.

4.2 Construction of Tri-Mendor Team

On the one hand, the shortage of entrepreneurship and innovation mendors is due to the lack of professional teachers participating in the guidance of entrepreneurship and innovation, and there is no situation of collaborative education; On the other hand, there is insufficient innovation and practice ability of teachers in the school, and the reserve of double-qualified teachers is insufficient. In view of the above two points, first of all, through the traction of professional teachers and the introduction of enterprise mentors, the establishment of "professional teachers, double and innovation guidance teachers, enterprise mentors" tri-mendor of entrepreneurship and innovation guidance system. the introduced corporate mentors are mainly selected from enterprises in the relevant fields of the four new engineering majors of the college, especially experts from leading enterprises and institutions such as Siasun Robotics, Neusoft Education Group, Shenyang Institute of Automation, Chinese Academy of Sciences, Huawei, etc., to establish a corporate mentor library and realize the joint guidance of corporate mentors with professional teachers and teachers of entrepreneurship and innovation. Make up for the shortage of teacher resources and the lack of engineering practice ability. Secondly, we pay attention to the training of tri-mendor. From the level of the school, adhering to the principle of "equal emphasis on introduction and training, focusing on training", the school conducts induction training for new teachers, encourages and guides professional teachers to participate in the training and teaching of basic courses of innovation and entrepreneurship, and organically integrates professional theoretical teaching teachers with industry practical teachers and innovation and entrepreneurship project guidance teachers. Support professional teachers to participate in the practical projects of the integration of professional and innovation and entrepreneurship, and improve the level of professional teachers' integration of innovation and innovation. With the integration of production and education as the starting point, by selecting professional teachers to participate in special education and training on innovation and entrepreneurship, training on various industry trends and cutting-edge technologies, and going to enterprises for temporary training, college teachers' professional skills and innovative and entrepreneurial thinking are constantly improved. In addition, teachers are encouraged to apply for mass innovation and innovation research projects, and lead students in entrepreneurial practice in the form of a tutorial system to accumulate experience in innovation and entrepreneurship. Finally, an incentive mechanism is established, such as the title evaluation system and the evaluation system, which take teachers' participation in teaching research and innovation and entrepreneurship training as assessment indicators, give a certain tilt in weight, and encourage and guide teachers to actively participate in the revision, design and decision-making of teaching reform and talent training programs. Mobilize the enthusiasm of grassroots teachers in teaching research and practice, integrate professional and innovation and entrepreneurship resources, form a

specialized and integrated teaching team, and promote the routine formative management of teaching discussion and teaching experience exchange. Through the research and practice of teaching content, teaching method, teaching problem and teaching mode, the system of transforming the research results of specialized teaching is established to promote the development of talents training to flexibility, diversification and effectiveness.

4.3 Build a Dual Course Model of "Professional Course" and "Entrepreneurship and Innovation Course"

Adhering to the education concept of innovation and integration, we build a dual course model of "professional course" and " entrepreneurship and innovation course ".

(1) Professional Course

In the construction of "professional course", innovation and entrepreneurship education should be strengthened, and the curriculum system of entrepreneurship and innovation should be integrated into the professional curriculum system. the applicant of this project is a front-line teacher of robotics engineering. As a link between professional construction and the construction of the training system of entrepreneurship and innovation, robot engineering should be taken as a pilot major to realize the reform of the professional training system. In addition to the basic theory teaching system, two lines are sorted out for the training of innovative practical ability and the training of engineering practical ability, which are integrated into the curriculum of double innovation. From the cultivation of students' "innovative thinking consciousness - innovative basic ability - innovative practical ability", hierarchical training is carried out, while cooperating with the professional practice process.

In addition, in line with the innovation ability training courses of reform majors, the innovation ability training I in the freshman and sophomore years is mainly aimed at competitions organized by colleges and schools to cultivate students' innovative thinking and basic competition ability. Innovation ability training II, combined with professional courses, carry out the integration of course competitions, mainly relying on provincial competitions and national engineering training competitions, so that students can apply their professional knowledge and achieve the cultivation of students' basic innovation ability; Finally, in the junior and senior years, comprehensive ability training will be carried out, combined with the graduation content, through project-driven, integration of production and education, joint guidance by enterprise mentors and other means, to meet the needs of national competitions and enterprise scientific research projects, so that students can truly solve practical engineering problems, step by step, and comprehensively improve their innovative practical ability.

(2) Entrepreneurship and Innovation Course

In the process of talent training, the second classroom is the extension and beneficial supplement of the first classroom. As the person in charge of the Innovation and Entrepreneurship Center and the Lingyi Innovation Club of the University, the applicant intends to rely on the innovation and Entrepreneurship Center and the innovation and Entrepreneurship Club to build the second classroom for the training of mass innovation and entrepreneurship talents-"innovation and entrepreneurship course", which mainly carries out the innovation and entrepreneurship training program for college students.

The whole process of students' extracurricular science and technology activities, discipline competitions, innovation and entrepreneurship course group training courses, humanistic literacy and ideological quality education, expert lectures, association activities, social practice activities, skill training, innovation and entrepreneurship salon, road show, innovation and entrepreneurship project cultivation, etc. are incorporated into the "innovation and entrepreneurship course", and the activities of the second class are integrated into the "Innovation and entrepreneurship Training Plan for College Students". the plan should include five aspects: scientific research and innovation training plan, entrepreneurship training plan, science and technology competition plan, humanistic literacy improvement plan and vocational skills training plan (five sub-plans). Each sub-plan contains several project categories, and each project category consists of several specific activity items. ① the scientific research innovation training program is mainly to organize and carry out various kinds of

scientific research (including incubation of innovation and entrepreneurship projects, participation in teachers' research projects, etc.), technological invention, innovative experiments, open experiments and other activities. ② the entrepreneurship training plan is mainly to organize and carry out entrepreneurship education, salon forum, road show and other entrepreneurial practice activities. ③ the science and technology competition plan is mainly to organize and participate in discipline competitions, challenge cup competitions and other professional (skill) competitions. ④ the humanistic quality improvement plan is mainly to organize and carry out community activities, mass (non-professional) literary and sports activities and social practice activities, etc., to enhance cohesion and organizational ability. ⑤ Vocational skills training program mainly encourages students to participate in foreign language ability, computer application ability and various vocational qualifications, professional skills training and certification activities.

The above five aspects of the plan will be included in the form of credits in the double innovation talent training program, as innovation and entrepreneurship practice credits, or other courses to support graduation.

4.4 Construction of Quality Evaluation System

The operation and management mechanism of the university innovation and entrepreneurship training plan is established. the innovation and entrepreneurship training plan for college students shall implement the project responsibility system and adopt the method of "project management" in accordance with the principle of "overall design and item-by-item implementation". the program will run through the whole training process, and will be rolled out every semester in the form of the second classroom activity project, and the management methods and rules for the organization and implementation of each sub-project will be formulated.

A management mechanism for entrepreneurship and innovation projects is established. Pay attention to the cultivation of entrepreneurship and innovation projects, enhance students' understanding, enrich project sources, and strengthen the project process management. the process management of mass innovation projects takes the time cycle as the main line, and controls all aspects of the project from the preparation stage (application and approval), the implementation stage (mid-term inspection) and the conclusion and acceptance. Guided by the project goal, stage goal setting is carried out, target disassembly is carried out in combination with the project results, and a comprehensive, diversified and multi-angle quality evaluation system is established with an effective two-way feedback mechanism.

Guarantee of quality control and evaluation system is established by a special incentive mechanism, performance evaluation mechanism and supervision mechanism, mainly with the outcome output as the evaluation standard, to ensure the smooth implementation of the training mode of innovative and entrepreneurial talents.

5. Practice and Achievement

Based on a comprehensive analysis of college students' scientific and technological innovation competition, outstanding big innovation projects and actual employment demand in the field of artificial intelligence, seven training groups have been established for students of four undergraduate majors in our college, namely, computer vision, deep learning, ROS, UAV, industrial robot, embedded development and big data technology. Each team will be led by two teachers and one to three junior and senior students with excellent technical level and rich experience to set up a steering group, and regularly train students in relevant skills and innovative methods.

Taking 12 young and middle-aged backbone teachers of the college as the team, and inviting 5 famous entrepreneurs from inside and outside the province as enterprise mentors, the College of Artificial Intelligence has established the double innovation teacher base. the service areas of the company founded by the five famous entrepreneurs include intelligent driving, information big data, embedded system integrated development and computer vision.

The project team members have passed the training mode of this project and guided the students to win 1 national big creation project,

1 national second prize in the Ministry of Education's white list, 3 first prizes in provincial science and technology competitions, and 2 second prizes.

Upon the suggestion of project team members and the development of the course plan, the robot engineering major added the practical links of "Innovation Training and Actual Combat I, II", which will be carried out after the completion of the course "Object-oriented Programming Foundation" in the first semester of freshman year and "Robot Operating System" in the second semester of sophomore year. the content is the actual case operation of STM32 microcontroller and the actual development case of ROS system, aiming at enabling students to quickly apply the theory they have learned to practice after having C++ and ROS foundation, and quickly master the development process and method of the robot's lower computer and upper computer in the form of cases. In the examination link of the "Innovation Training and Actual Combat I, II" course, according to the concept of specialized innovation and integration education, the results of the "Xiangyuan Cup Intelligent Car Competition" and the results of the "China Soft International AI Challenge" will be considered respectively, and the course score assessment will be combined with the results of the science and technology innovation competition to comprehensively examine the students' practical and innovative ability.

Through the in-depth analysis of the two theme tracks of the Ruizang Race intelligent investigation and intelligent logistics, combined with the existing hardware equipment of the college, the integration of the theme track competition project of science and technology competition and the topic selection of graduation design is realized. It enables the graduates to lead the lower grade students to quickly realize the introduction of competition-related skills, and the lower grade students also provide assistance and inspiration for the graduation students in their own learning process, and jointly complete the actual development and innovation of the project, and realize the technical inheritance between the high- and low-grade students. A number of enterprises have been invited to carry out practical skills training and employability guidance for students.

6. Conclusion

In this paper, a four-in-one training system for entrepreneurship and innovation talents is proposed, including "four dimensions, tri-mendor, two classrooms and one guarantee". A new four-dimensional training model of "student-centered, ablity-cored, results-oriented, profession and innovation integration" is proposed. the " professional teachers, innovation mentors, and enterprise mentors " tri-mendor training mode of entrepreneurship and innovation is also established. the dual-course model of "professional course" and " entrepreneurship and innovation course" is built for college students. Then, a quality evaluation system for the training of inno entrepreneurship and innovation talents is established, standardize the management system, establish an incentive mechanism and a quality evaluation system. the implementation of the proposed talent training model has made a lot of achievements and helped students get excellent results in a number of competitions.

Acknowledgments

This work was supported in part by the Teaching Reform Research Project of Shenyang Aerospace University JG242602E3, the Shenyang Aerospace University Undergraduate Demonstration Teaching Reform Research project SFJG20230303 (Innovation and Integration), the Shenyang Aerospace University excellent curriculum ideological and political demonstration teaching reform research project KCSZJG2319. and in part by the Teaching Reform Research Project of Shenyang Aerospace University JG242801A4.

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